

Claims

We claim:

1. An isolated polynucleotide sequence comprising:

- a) a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;
- b) a polynucleotide sequence having at least about 20% to 99.99% identity to a polynucleotide selected from the group consisting of SEQ ID NOs: a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;
- c) a polynucleotide sequence encoding a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116 or the complement of a polynucleotide sequence encoding a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116; or
- d) a polynucleotide sequence encoding a polypeptide encoded by the complement of SEQ ID NOs:3, 20, 24, 32, 33, 47, 51, 53, 56, 57, 63, 68, 72, 73, 77, 78, 90, 93, 103, and 104; or

- e) a polynucleotide sequence encoding a polypeptide fragment or variant of a), b), c) or d), wherein said fragment or variant has substantially the same serologic activity as the native polypeptide; or
- f) a polynucleotide sequence encoding a polypeptide fragment or variant of a polypeptide encoded by the complement of a), b), c), d), or e), wherein said fragment or variant has substantially the same serologic activity as the native polypeptide.

2. The isolated polynucleotide sequence of claim 1, wherein said polynucleotide sequence further comprises regulatory elements capable of causing the expression of said polynucleotide sequence in expression systems and, optionally, a polynucleotide sequence encoding a heterologous polypeptide sequence.

3. The isolated polynucleotide according to claim 2, wherein said polynucleotide sequence further comprises a vector.

4. The isolated polynucleotide sequence according to claim 3, wherein said vector is a vaccine vector.

5. The isolated polynucleotide sequence according to claim 3, wherein said vector is a replication vector.

6. The isolated polynucleotide sequence of claim 4, further comprising a carrier, pharmaceutical carrier, or adjuvant.

7. A host cell comprising a polynucleotide sequence comprising:

- a) a polynucleotide sequence selected from the group consisting of SEQ ID NOS:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;

b) a polynucleotide sequence having at least about 20% to 99.99% identity to a polynucleotide selected from the group consisting of SEQ ID NOs: a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;

c) a polynucleotide sequence encoding a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116 or the complement of a polynucleotide sequence encoding a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116; or

d) a polynucleotide sequence encoding a polypeptide encoded by the complement of SEQ ID NOs:3, 20, 24, 32, 33, 47, 51, 53, 56, 57, 63, 68, 72, 73, 77, 78, 90, 93, 103, and 104; or

e) a polynucleotide sequence encoding a polypeptide fragment or variant of a), b), c) or d), wherein said fragment or variant has substantially the same serologic activity as the native polypeptide; or

f) a polynucleotide sequence encoding a polypeptide fragment or variant of a polypeptide encoded by the complement of a), b), c), d), or e), wherein said fragment or variant has substantially the same serologic activity as the native polypeptide.

8. An isolated polypeptide comprising:

a) a polypeptide encoded by a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;

- b) a polypeptide encoded by a polynucleotide sequence having at least about 20% to 99.99% identity to a polynucleotide selected from the group consisting of SEQ ID NOs: a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;
- c) a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116 or the complement of a polynucleotide sequence encoding a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116; or
- d) a polypeptide encoded by a polynucleotide sequence encoding a polypeptide encoded by the complement of SEQ ID NOs:3, 20, 24, 32, 33, 47, 51, 53, 56, 57, 63, 68, 72, 73, 77, 78, 90, 93, 103, and 104; or
- e) a polypeptide encoded by a polynucleotide sequence encoding a polypeptide fragment or variant of a), b), c) or d), wherein said fragment or variant has substantially the same serologic activity as the native polypeptide; or
- f) a polypeptide encoded by a polynucleotide sequence encoding a polypeptide fragment or variant of a polypeptide encoded by the complement of a), b), c), d), or e), wherein said fragment or variant has substantially the same serologic activity as the native polypeptide.

9. The polypeptide of claim 9, further comprising a carrier, pharmaceutical carrier, or adjuvant.
10. The polypeptide according to claim 9, further comprising a heterologous polypeptide sequence.

11. A method of inducing immunity in an individual comprising the administration of a composition comprising a carrier and:

a)

- i) a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;
- ii) a polynucleotide sequence having at least about 20% to 99.99% identity to a polynucleotide selected from the group consisting of SEQ ID NOs: a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;
- iii) a polynucleotide sequence encoding a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116 or the complement of a polynucleotide sequence encoding a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116; or
- iv) a polynucleotide sequence encoding a polypeptide encoded by the complement of SEQ ID NOs:3, 20, 24, 32, 33, 47, 51, 53, 56, 57, 63, 68, 72, 73, 77, 78, 90, 93, 103, and 104; or

v) a polynucleotide sequence encoding a polypeptide fragment or variant of a), b), c) or d), wherein said fragment or variant has substantially the same serologic activity as the native polypeptide; or

vi) a polynucleotide sequence encoding a polypeptide fragment or variant of a polypeptide encoded by the complement of a), b), c), d), or e), wherein said fragment or variant has substantially the same serologic activity as the native polypeptide; or

b)

i) a polypeptide encoded by a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;

ii) a polypeptide encoded by a polynucleotide sequence having at least about 20% to 99.99% identity to a polynucleotide selected from the group consisting of SEQ ID NOs: a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;

iii) a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116 or the complement of a polynucleotide sequence encoding a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35,

37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109,
111, 112, 113, and 116; or

iv) a polypeptide encoded by a polynucleotide sequence encoding
a polypeptide encoded by the complement of SEQ ID NOS:3, 20, 24, 32, 33,
47, 51, 53, 56, 57, 63, 68, 72, 73, 77, 78, 90, 93, 103, and 104; or

v) a polypeptide encoded by a polynucleotide sequence encoding
a polypeptide fragment or variant of a), b), c) or d), wherein said fragment or
variant has substantially the same serologic activity as the native polypeptide;
or

vi) a polypeptide encoded by a polynucleotide sequence encoding a
polypeptide fragment or variant of a polypeptide encoded by the complement
of a), b), c), d), or e), wherein said fragment or variant has substantially the
same serologic activity as the native polypeptide.

12. The method according to claim 11, further comprising the administration of an antigen booster.

13. The method according to claim 11, wherein said immunity is protective immunity.

14. The method according to claim 11 a)i), a)ii), a)iii), a)iv), a)v) or a)vi), wherein said polynucleotide sequence further comprises a vaccine vector.

15. The method according to claim 11 a)i), a)ii), a)iii), a)iv), a)v) or a)vi), wherein said polynucleotide sequence further comprises regulatory elements capable of causing the expression of said polynucleotide sequence in expression systems and, optionally, a polynucleotide sequence encoding a heterologous polypeptide sequence.

16. The isolated polynucleotide sequence of claim 4, further comprising a carrier, pharmaceutical carrier, or adjuvant.

17. A method of detecting the presence of *Ehrlichia ruminantium* in a biological sample comprising contacting said sample with:

a)

- i) a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;
- ii) a polynucleotide sequence having at least about 20% to 99.99% identity to a polynucleotide selected from the group consisting of SEQ ID NOs: a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;
- iii) a polynucleotide sequence encoding a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116 or the complement of a polynucleotide sequence encoding a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116; or

iv) a polynucleotide sequence encoding a polypeptide encoded by the complement of SEQ ID NOs:3, 20, 24, 32, 33, 47, 51, 53, 56, 57, 63, 68, 72, 73, 77, 78, 90, 93, 103, and 104; or

v) a polynucleotide sequence encoding a polypeptide fragment or variant of a), b), c) or d), wherein said fragment or variant has substantially the same serologic activity as the native polypeptide; or

vi) a polynucleotide sequence encoding a polypeptide fragment or variant of a polypeptide encoded by the complement of a), b), c), d), or e), wherein said fragment or variant has substantially the same serologic activity as the native polypeptide; or

b)

i) a polypeptide encoded by a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;

ii) a polypeptide encoded by a polynucleotide sequence having at least about 20% to 99.99% identity to a polynucleotide selected from the group consisting of SEQ ID NOs: a polynucleotide sequence selected from the group consisting of SEQ ID NOs:2, 3, 4, 8, 10, 12, 15, 17, 19, 20, 21, 23, 24, 25, 27, 29, 31, 32, 33, 34, 36, 38, 39, 41, 43, 45, 46, 47, 48, 51, 52, 53, 54, 56, 57, 58, 59, 61, 63, 64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 84, 85, 87, 88, 90, 92, 93, 94, 95, 96, 98, 100, 101, 103, 104, 105, 106, 108, 110, 114, and 115 or the complements thereof;

- iii) a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116 or the complement of a polynucleotide sequence encoding a polypeptide selected from the group consisting of SEQ ID NOs:5, 9, 11, 16, 18, 22, 26, 28, 30, 35, 37, 40, 42, 44, 55, 60, 62, 66, 71, 76, 80, 83, 86, 89, 97, 99, 102, 107, 109, 111, 112, 113, and 116; or
- iv) a polypeptide encoded by a polynucleotide sequence encoding a polypeptide encoded by the complement of SEQ ID NOs:3, 20, 24, 32, 33, 47, 51, 53, 56, 57, 63, 68, 72, 73, 77, 78, 90, 93, 103, and 104; or
- v) a polypeptide encoded by a polynucleotide sequence encoding a polypeptide fragment or variant of a), b), c) or d), wherein said fragment or variant has substantially the same serologic activity as the native polypeptide; or
- vi) a polypeptide encoded by a polynucleotide sequence encoding a polypeptide fragment or variant of a polypeptide encoded by the complement of a), b), c), d), or e), wherein said fragment or variant has substantially the same serologic activity as the native polypeptide.